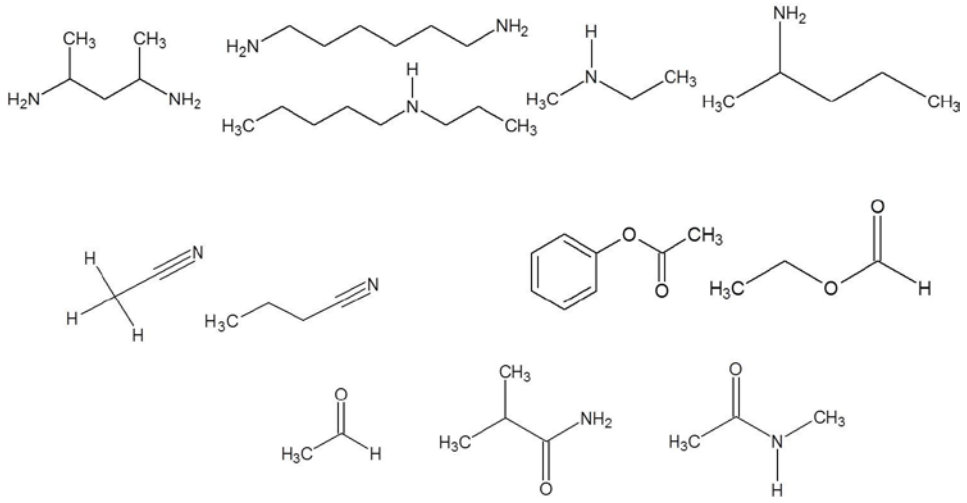
T20D01 – 20.1-20.1 HL Organic Reactions

Name …….

20.1 - INTRODUCTION:

1. 20.1.1 Deduce structural formulas for compounds containing up to six carbon atoms with one of the following functional groups: amine, amide, ester and nitrile. (3)
    a. As a review (it was covered in 10.1) draw the general structure and give the IUPAC suffix for each:

2. 20.1.2 Apply IUPAC rules for naming compounds containing up to six carbon atoms with one of the following functional groups: amine, amide, ester and nitrile. (2)
    a. Name each of the following organic molecules:



20.2 - NUCLEOPHILIC SUBSTITUTION REACTIONS:

1. 20.2.1 Explain why the hydroxide ion is a better nucleophile than water. (3)

2. 20.2.2 Describe and explain how the rate of nucleophilic substitution in halogenoalkanes by the hydroxide ion depends on the identity of the halogen. (3)

3. 20.2.3 Describe and explain how the rate of nucleophilic substitution in halogenoalkanes by the hydroxide ion depends on whether the halogenoalkane is primary, secondary or tertiary. (3)

4. 20.2.4 Describe, using equations, the substitution reactions of halogenoalkanes with ammonia and potassium cyanide. (2)
    a. Substitution with Ammonia:

    b. Substitution with Cyanide:

5. 20.2.5 Explain the reactions of primary halogenoalkanes with ammonia and potassium cyanide in terms of the SN2 mechanism. (3)
    a. Mechanism with ammonia:

    b. Mechanism with cyanide:

6. 20.2.6 Describe, using equations, the reduction of nitriles using hydrogen and a nickel catalyst. (2)

20.3 - ELIMINATION REACTIONS:

1. 20.3.1 Describe, using equations, the elimination of HBr from bromoalkanes. (2)
    a. What is an elimination reaction?

    b. Generalize the elimination of HBr using an structural formulas:

    c. What are the favored conditions for the elimination of HBr?

    d. Provide the equations for bromoethane, 1-bromopropane, and 2-bromopropane and their elimination of HBr:

    e. Provide the equation for the elimination of HBr from a longer chain (2-bromobutane):

2. 20.3.2 Describe and explain the mechanism for the elimination of HBr from bromoalkanes. (3)
    a. What is the difference between the E1 and the E2 mechanism? What other reactions does this relate to?

    b. Which mechanism do primary, secondary, and tertiary compounds prefer?

    c. Provide the E1 mechanism for the elimination of HBr from 2-bromopropane:

    d. Provide the E2 mechanism for the elimination of HBr from 2-bromopropane: